

THE
PSYCHOLOGICAL BULLETIN

THE STUDY AND TREATMENT OF RETARDATION:
A FIELD OF APPLIED PSYCHOLOGY.

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No valid distinction can be made between a pure and an applied science. That "the final test of the value of what is called science is its applicability" is the opinion of a former president of the American Association for the Advancement of Science. This thought impelled me as long ago as the meeting of 1896, to lay before the members of the American Psychological Association an outline of a field of applied psychology. Under the designation of practical work in psychology was included: (1) The direct application of psychological methods to therapeutics and to education, whether by professional psychologists, practicing physicians, or educators. (2) Such psychophysical investigation of mental conditions and processes as may serve to throw light upon the problems presented in the practice of medicine or teaching. (3) Instruction in psychology containing the promise of usefulness to students of medicine and education in their respective professions.

Thus the plan had a view to the professional practice of psychology, to research and to instruction, as these stand related to the two professions of medicine and teaching.

During the twelve years which followed the first announcement of this plan of practical work, the Laboratory of Psychology at the University of Pennsylvania has been engaged in prosecuting original research along these lines, and in training investigators capable of carrying on independent work. Sufficient time has now elapsed to present a statement of what has been accomplished.

In the prospectus to which I have referred, I suggested the necessity of a psychological clinic, or dispensary, which I had recently organized at the University of Pennsylvania, and which has since been

continued, receiving children from the public schools, from the juvenile court, charitable organizations, and from physicians. This work has grown year by year until at the present time we are seeing from six to ten new cases each week. In the examination and treatment of cases referred to the psychological clinic, I am assisted by three medical associates and a number of psychological assistants, including Dr. Holmes, who is specializing in the direction of the moral training of adolescents, and Miss Town, who is resident psychologist at the Friends' Asylum for the Insane.

Although the necessity of keeping these children under observation and prolonged training had led me to recommend the establishment of schools or homes for those children needing expert psychological and pedagogical treatment, it was not until July, 1907, that I was able to establish on a satisfactory basis what I originally called a hospital school, but more recently the Orthogenic School. This school is conducted by the Psychological Laboratory, as a medical school conducts a hospital, both for private and free cases. Through the psychological clinic, but chiefly in the orthogenic school, a number of cases have been under such prolonged observation and training that it is now possible to present reports which will show the mental and physical status of the child at the time he was received into the school, the methods of training and physical treatment employed, and the results which followed such treatment. Primarily for the purpose of reporting these cases in a satisfactory manner, the publication of a journal called *The Psychological Clinic* was undertaken in March, 1907.

I have recently proposed the word *orthogenics* as the name for that branch of science which investigates retardation and deviation and the methods of restoring to normal condition those who are found for one reason or another to be retarded or deviate. Through the reporting in this journal of our work at the University of Pennsylvania, and of such independent work as that of Dr. Margaret K. Smith, of New Paltz, New York, and of Dr. Sterling, of Baltimore, we believe we are contributing to the establishment of a clinical psychology as a department of orthogenics.

The characteristic features of the clinical method in psychology are :

1. Its concern for the individual, which makes it in effect an individual psychology ; and
2. The application of remedial or orthogenic treatment to individual cases of retardation or deviation, and even to the hypothetically normal child.

A comparative psychology may be based upon a study of indi-

viduals or upon a study of groups of individuals; that is to say, upon the clinical method primarily or the statistical method primarily. Accomplishments of the statistical method are admirably shown in such investigations as have proceeded from or been inspired by Cattell and Thorndike. But the statistical method is susceptible of great error, as Thorndike has pointed out in his report on elimination. He claims that to settle the question of elimination from the grades, it would be necessary to follow a large number of individual children through the eight grades of the school and through the high school. In other words, he proposes to develop a statistical result on the basis of an individual psychology and from an application of the clinical method. The germ of this method is undoubtedly to be found in the remarkable investigations initiated by Dr. Hall through the employment of a syllabus. At the University of Pennsylvania we realized the necessity for obtaining statistical data through the clinical method as soon as we sought to determine the number of backward children in the public schools. This work has produced results of value and has led to a restatement of the problem of retardation.

It is well known that Séguin was the first to subsume idiocy under the concept of retardation. He defined idiocy as an arrest, or retardation of development. He himself distinguished between idiotism as the mental state and idiocy as the brain defect upon which idiotism might rest, a distinction which suggests the possibility that idiotism may be a mental status not resting upon an incurable brain defect. As soon as a civilized community begins to enforce compulsory education it is discovered that there are a number of children unable to make normal progress through the grades. How many such children are there in the public schools?

This question cannot be answered by a clinical examination alone. It must be solved, in the first instance, by what is essentially the statistical method, as this has been developed by Cattell and Thorndike. I am led, therefore, to distinguish between psychophysiological retardation and pedagogical retardation. Physiological retardation may be defined in two ways, either as a failure of the child to reach the supposed normal level of development for his chronological age, or as a failure of the child to reach the development indicated by his natural endowments. Any child who reaches adult age without having had his brain developed up to the full limit of its capacity has suffered from retardation and will manifest throughout his life an arrest of development. It is possible that the brightest member of a class may be more retarded than the dullest. I believe that these two definitions

of retardation should be kept separate, but neither of these is a satisfactory definition with which to approach the problem of retardation in the schools. Our standard of the hypothetical normal child is inadequate and unsatisfactory, and our opinion as to whether a child at a given stage of development is as far along as he ought to be must necessarily be a matter of conjecture. To fix the standard of retardation I undertook to define pedagogical retardation with reference to the number of years that a child was behind the grade for his age. This involved a statistical classification of the children of a public school system by grades and ages.

Superintendent Bryan undertook this investigation for the city of Camden, N. J. He found that 26 per cent. were two years or more behind the grade in which their age should have placed them; that 12.7 per cent. were three years or more behind the proper grade, and nearly 5 per cent. were four years or more behind grade. Indeed, backwardness or retardation, measured in terms of school progress, is manifested by a surprisingly large percentage of children. Thus, Dr. Cornman shows for five cities of the United States, comprising one fifth of the elementary school population, that from 21.6 per cent. to 49.6 per cent. are one year or more behind the grade in which the school and the public expects these children to be; that from 7.3 per cent. to 26.3 per cent. are two years behind the proper grade; that from 2.1 per cent. in one city to 12.7 per cent. in another city are three years or more behind grade; and in one city as high as 5.1 per cent. are four years or more behind the grade in which these children should be.

A great deal of confusion exists in the mind of the people, and also in that of our educational authorities, as to exactly what a backward child is. Just as soon as the discovery is made that some children manifest backwardness or retardation in their school work, and special classes are formed to facilitate the progress of these children, we find these classes filled up with children who are incurably feeble-minded, who cannot be trained in public day schools and who should be sent for training and care to some special school like that at Elwyn. Thus, I have brought to me at the University of Pennsylvania for examination and suggestion as to educational treatment, children who have been rejected from the Pennsylvania Training School for Feeble-minded Children, because they were below the level of children who could be educated in that school. And yet these children were applying for admission to the public schools, and in some instances were to be found in the grades for normal children.

This failure to recognize that there is a difference between feeble-minded children who cannot be educated in public day schools and other children properly designated backward, who can be trained in day schools and some of whom can be restored to normal condition, results in the calling of many incurably feeble-minded children, 'backward children.' However justifiable this may be to save the sensibilities of the parents, it simply confuses the problem of remedying the backwardness which is found throughout the grades in many of our city schools.

Independently, Dr. Falkner, while Commissioner of Education for Porto Rico, and Mr. Ayres, while Superintendent of Schools at San Juan, came upon this problem from the standpoint of a superintendent. Endeavoring to compare the schools of Porto Rico with those of the United States, they could find no statistics which would enable them to determine whether the pedagogical retardation of children in the Porto Rican schools was greater or less than that prevailing in city school systems in the United States. It was not until they obtained the statistics of Bryan and Cornman that they had the material data for a preliminary statistical comparison and analysis of conditions. They are now in the position, Dr. Falkner as statistician for the Immigration Commission, and Mr. Ayres as Director of the Backward Children Investigation of the Russell Sage Foundation, to contribute results which will be determinative for the schools of this country. Mr. Ayres is employing the clinical method also, in connection with his statistical investigation.

Recently, the Russell Sage Foundation persuaded Dr. Gulick also to devote himself to this work, and we look to this Foundation to do as important a piece of work in connection with the problem of retardation in the public schools, as the Rockefeller Institute is expected to accomplish in the study and treatment of disease. In our work and the work of Twitmyer, Bryan, Cornman, Heilman, Thorndike, Gulick, Ayres and Falkner, we see the foundations of a new science. It is strictly an applied psychology. It may be designated also as experimental or scientific pedagogy in the proper sense of that word.

From the cultivation of this field of applied psychology we expect results of value to psychology and education for the following reasons: (1) The investigation of retardation, which measures the amount by which individual children fall short of obtaining a standard public school education, is an approach to the problem of education from the right direction. These investigations will furnish standards of reference which will enable us to determine to what extent we fail to really

educate the rising generation in this country. (2) These investigations are demonstrating to educators the necessity of calling upon the psychological expert to assist in solving their peculiar problems. In Philadelphia merely publishing the fact that 12.7 per cent. of the children of Philadelphia had been more than two years in grade in June, 1907, reduced the number of such children in June, 1908, to 6.6 per cent. (3) It offers to superintendents, through both the statistical and clinical methods, and to grade teachers, through the clinical method alone, an opportunity to do practical work, as a result of which they may become original contributors to the science of psychology and to education. (4) This will ultimately make the profession of teaching a scientific profession, which it is not at present, because educational practice remains to-day largely a matter of opinion. Medicine is a scientific profession because of the invention of instruments of precision like the thermometer and because of the development of exact methods of observation and report. I look forward to the day when the educator will also be looked up to as a scientific authority whose opinions will either no longer be questioned by a foolish parent or some ignorant member of a school board, or else, if questioned, can be supported by an appeal to unanswerable facts. (5) The development of an applied psychology assures the future of psychology as a pure science, for in the final analysis the progress of psychology as of every other science will be determined by the value and amount of its contributions to the advancement of the human race. Let us hope that we are even now escaped from beneath the pall of such debilitating opinions as the one attributed to William James: "Perhaps you will ask me what are the practical benefits conferred on the world by this interesting science. So far as I am able to discern, absolutely none." (6) Through applied psychology, in training psychological experts for our public school systems as well as for institutions for the insane and the training of feeble-minded children, we shall find another outlet for our students than that which leads them to the gateway of an academic career.

JUVENILE DELINQUENCY AND JUVENILE CONTROL.

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Mankind is prone to be either predominantly scientific in its judgments or excessively emotional, and it is because juvenile delinquency appeals so strongly to the latter type of mind that its literature is largely of the emotional sort. This makes many of the books useless as a guide for action, because emotional therapeutics have little remedial value in the social maladies of boyhood. It would not be correct to say that boys are emotionally unresponsive, but their emotions are of the primitive kind. The civilized emotions are either too modernly ethical, directed toward a social benefit so far removed from the immediate interest of boys as to have no vital meaning for them, or too attenuated to appeal to their vigorous racial standards. For this reason the best literature on juvenile control must be sought in the writings of men who approach the problem through the ideals and inherited tendencies of the boys themselves, the only gateway to their inner life. Permission to a boy to tour the state on freight trains, under certain stipulated conditions, would seem to many a hazardous method of reformation, yet that is what Judge Lindsey did,¹ and the best part of the story is that it proved of prophylactic value where officinal remedies had failed. Boys respond with amazing fidelity to responsibility when it is unreservedly and frankly put upon them, because adaptation is characteristic of childhood, but when the mailed hand is visible through a thin coating of responsibility they discover the pretense, and their adaptation then takes the form of self-protecting deception. The reaction of boys is of much the same sort as the action of their elders toward them. This defensive response is a part of their racial inheritance. Judge Lindsey recognizes the vested interests of the race in its primitive instincts. For this reason boys who are honest with no one else tell him the truth.

Self-assertion, obedience to no laws save those which the individual has imposed upon himself, is the modern expression of primitive egoism and its source lies far back among our animal ancestors. Vanity,

¹ 'Problems of the Children and How the State of Colorado Cares for Them,' A Report of the Juvenile Court of Denver.

to which pupil government owes much of its attraction, is a very ancient instinct, long antedating man himself, and its tenacious hold upon the race makes it one of the most vulnerable points of attack in children. They feel immeasurable joy in the display of power, and they revel in the consciousness of personal responsibility. No particular scheme of self-government is essential to success, but the pupils must feel that the responsibility is actually theirs, and there must be enough machinery in the plan to give them something to manage. 'The School City' meets these requirements and the plan as formulated in the reports¹ makes an excellent center from which such deviations may be made as local conditions suggest.

A variety of occupations also assists in eliminating the mental resistance by offering a more extensive field for individual initiative and control, and by giving a larger field of responsibility through having more machinery to manage. This is one of the reasons why the Thompson's Island Farm and Trades School,² Boston Harbor, the George Junior Republic,³ and the Carter Republic,⁴ have had such remarkable success. Cronson's plan⁵ of self-government supplies this need of machinery by truancy, patrol, and health squads.

Among the many books on delinquency, intended as a guide in handling boys, *The Boy Problem*,⁶ of which a new edition has just appeared, and *Winning the Boy*,⁷ are the most serviceable. The first derives its value from the study of the evolution of the child, which the author made before writing the book, while the second partakes of the spirit of the Denver master with whom Dr. Merrill was for several years associated.

Those who have studied criminology are not surprised by the statement in *The Young Malefactor*⁸ that hardly more than two per cent. of first court offenders are criminals by nature. This book is decidedly valuable because the lay reader is not confused, as in so many other scientific books on the young criminal, by a mass of facts and statistics about abnormal cases. Dr. Travis shows at the outset that abnormal children — the criminals by nature — constitute a very small propor-

¹ Wilson L. Gill, 340 W. Duval St., Germantown, Pa.

² Reports of the Board of Managers, Tucker Deland, Secretary, 19 Exchange Place, Boston.

³ Reports of the George Junior Republic, Freeville, N. Y.

⁴ Reports of the William T. Carter Republic, Redington, Pa.

⁵ *Pupil Self-Government*, by Bernard Cronson, The Macmillan Co.

⁶ W. B. Forbush, The Pilgrim Press, Chicago.

⁷ Lilburn Merrill, Fleming H. Revell Co.

⁸ Thomas Travis, Thomas Y. Crowell & Co.

tion of the actual cases, and then, by a study of social hygiene, he proceeds to put upon society, where it properly belongs, the responsibility for transforming the others into criminals.

The problems involved in school discipline, and in creating an interest in study, are so intricately interwoven with the general attitude of children toward their teacher and their work that juvenile delinquents are only somewhat extreme instances of the cases with which teachers are daily confronted. For this reason the reports of the juvenile courts of Denver, Salt Lake City, and Indianapolis, as well as the 'Children's Courts in the United States,'¹ are especially valuable for those desirous of understanding boys. Remedial treatment of unusual curative value in extreme disease cannot be had precautionary measures in less virulent forms of the malady. The juvenile courts which have reformed most of the boys brought before them, instead of making them into habitual criminals, have succeeded because their officers know how to utilize racial instincts in the mental and moral development of children. This is what makes their report pre-eminent in the literature of juvenile control.

¹ House Document No. 171, 2d Session, 58th Congress.

AN ATTEMPT TO DEFINE THE TERMS USED IN CONNECTION WITH RIGHT-HANDEDNESS.

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Any attempt to discuss the nature of the physiological features concerned in the problems of right and left-handedness is greatly hampered by the lack of precision in the nomenclature of the subject and by the number of different meanings with which most of the terms are at present invested. The object of the present note is to try to discover how far uniformity of meaning may be attained in the scientific use of these terms with the minimum of estrangement from the connotation in which they are currently employed. In a number of instances attributes supposed to be characteristic of various organs and functions of the body have been metaphorically applied to mental processes — we thus speak of a splenetic temperament, a hearty greeting, a short-sighted judgment, etc. — but in no sphere except in that of manual aptitude has this led to any noticeable confusion, the metaphorical nature of the expression being usually obvious.

The special capacity of the normal right hand, forming as it does a natural standard of aptitude, has given rise to a series of words etymologically based on this fact, but now only by metaphor connected therewith, and often used to denote intellectual or even moral superiority. Expressions built from the word 'hand,' such as, a handy implement, a right-hand assistant, a left-handed transaction, etc., give rise to little or no confusion, but the case is otherwise with those built from the Greek and Latin root 'dexter.' The latter includes a large number of terms, many of which are indispensable for certain purposes, and it is with these that we are here concerned. The current connotations attached to them are cited from Murray's Oxford English Dictionary, for this is by far the most complete work of the kind extant, and the New Century and other dictionaries contain no material that is not given there.

A. *Right-sidedness.* — If any adjective other than the simple English one of right-sided be required to denote this attribute, it should be the word 'dexter.' This adjective has been used in five different connotations, but all except that of right-sided are obsolete. Two

other adjectives, 'dextral' and 'dexterous,' are sometimes also used for this purpose, but this use of them seems objectionable, because not only is it superfluous but it tends to lead to confusion with other connotations of the same terms.

B. *The Special Capacity Characteristic of the Normal Right Hand.*—So far as I know there is no expression in use for the designation of this important and peculiar capacity. I would suggest that the term 'dextrality' be used for this purpose,¹ for it is a rare word and is usually employed as an unnecessary synonym for the simple English expression right-handedness. 'Dextral' would then signify precisely 'pertaining to the excess of aptitude which one of the two hands, usually the right, normally acquires.' The group of functions in respect to which this excess of aptitude is acquired may thus be called dextral functions. At present the adjective 'dextral' is rarely used, and only to indicate 'on the right side,' a use which, as mentioned above, is entirely superfluous.² 'Dextrally,' which now means 'to the right' would then signify 'in a manner characteristic of the normal right hand.'

C. *General Adroitness comparable with Dextrality.*—This may refer to either manual skill or mental expertness, and the expression in question is clearly a metaphorical one. 'Dextrous' (var. dexterous, dexterious), seems marked out by its characteristic plenary termination for use in this metaphorical sense of 'full of right-handedness.' The term has been used in seven different connotations. All these are obsolete except the one here indicated, though it is still sometimes used unnecessarily to signify right-handed. 'Dextrously' is used as the corresponding adverb, though it also is occasionally used to signify 'with the right hand.' 'Dextrousness' is obviously the corresponding substantive and should be confined to the metaphorical sense of indicating 'an excess of aptitude over the normal in any given function to which it is applied, comparable with that excess over the left hand characteristic of the normal right.' This of course is the current connotation of the word. 'Dexterical' is sometimes used as a synonym for dextrous; it seems an unnecessary word unless it be

¹This definition of 'dextrality' nearly resembles that given by Professor Baldwin in his *Mental Development in the Child and the Race*, 3d ed., 1906, p. 56, where he suggests that the term be used to denote 'the general fact of uneven-handedness.'

²This older usage has been recently urged by Gould (*Righthandedness and Lefthandedness*, 1908, p. 206). He would speak of the dextral and sinistral hands as synonyms for the right and left hands, but does not mention any advantage to be gained thereby.

found convenient to employ it to indicate manual adroitness as distinct from mental.

In the above account it will be noticed that definition of the commonest word of the group, 'dexterity,' is omitted. This word has been used in five different senses, the commonest being synonymous with dextrousness. It has entered so fully into common speech that it seems to me impossible to rescue it for any scientific purpose; it must therefore be recognized that it is a non-scientific expression used with no precise connotation.

Examples of the connotations above defined are best given by describing the common facts of right-handedness in the terms in question. Thus, in the normal person the dextral hand is the right, in a small number it is the left, and in a still smaller number both hands are dextral. All individuals can from this point of view be divided into three groups:

1. *Unidextrals*. — There are two subgroups (*a*) dextro-dextrals or right-handed individuals, dextrality being confined to the right side, and (*b*) sinistral-dextrals, left-handed individuals.

2. *Ambidextrals*. — Dextral functions here are performed equally well on either side. Ambidextral is a more accurate designation for this purpose than ambidextrous, which should be used only to signify an exceptional aptitude on both sides; so also is ambidextrality a more precise term than ambidexterity.

3. *Bi-dextrals*. — Some dextral functions are performed best on the right side, others on the left. A typical instance is the average left-handed individual, who bowls better with the left hand but writes better with the right. Strictly speaking, the majority of mankind are bi-dextral, for it is exceptional to find a right-handed individual who does not perform some action better with the left hand. Still it is preferable to restrict the term to indicate only those individuals in whom the *important* dextral functions are best performed, some on one side and some on the other.

It is of course generally accepted that all individuals primarily belong to the first group, the second and third being the results of education.

PSYCHOLOGICAL LITERATURE.

GENETIC LOGIC.

Thought and Things or Genetic Logic. Vol. II. Experimental Logic or Genetic Theory of Thought. JAMES MARK BALDWIN. London, Swan Sonnenschein & Co.; New York, Macmillan Co., 1908. Pp. 436 + xv.

This second volume, while lacking nothing in organic unity, contains a wealth of topics of which a review can give no adequate idea. Professor Baldwin has shed new light upon many old logical problems and (what is rare enough in logical treatises) has really contributed to our knowledge in several respects. These contributions, some of which we shall indicate later, together with a broad-mindedness which can combine opposite extremes of theory, are, in our view, the chief merits of the work. There is no recent book in English which has covered the field so fully, in so empirical a spirit, yet with such philosophical and logical power of interpretation. The 'pragmatic' works were constructive, and empirical, yet certainly without taking in as many facts or recognizing as many human needs and interests. The author is able to find a place for the practical, theoretic, esthetic, social, even 'logistic' motives that enter into human thought, to justify each and to restrain each to its proper limits. One must admit, however, that his exposition is difficult: and this is not owing merely to the numerous technical terms. We do not object to those terms; the future alone can decide that. Meanwhile we find most of them, at any rate, useful, even necessary. Such terms as 'presumption,' 'assumption,' 'imported' and 'essential singularity,' 'syndoxic,' 'synnomic' and many others, one quickly gets used to; and they designate indispensable distinctions. The style however is difficult in itself: in view of the importance of Professor Baldwin's work, we wish that he would expand some of the chapters: *e. g.*, Ch. III., the first half of Ch. IV., certain parts of Ch. VI., and other shorter passages. While the text is harder than that of Vol. I., it is a work on a larger scale, and is, we believe, correspondingly more important — though of course the two cannot really be separated.

In Vol. I. we saw the mind learning the use of its imagination, and the distinction of inner and outer, subject and object. It is accordingly now able consciously to apply the inner imagined object, the

idea, to the outer reality: this is judgment, and constitutes the 'logical' stage. The application of idea to reality is always more or less experimental (hence this volume's title). It is a stage of explicit dualisms: idea proposed (schematism), and belief or disbelief resulting from its application to reality; content and 'control'; conscious assumption (Meinong's *Annahme*) and 'presupposition' or belief, and other pairs.

The subject is expanded in detail along two lines: development of the content-side and of the belief or control-side. A short chapter (pp. 3-13) defining the logical stage constitutes Part I., 'Introduction.' Part II., 'Genetic Theory of Thought, How Thinking Goes On,' contains the main contributions to theory of judgment. Roughly speaking, Chs. II.-V. treat the control-side, Chs. VI.-IX. the content-side. The passage from prelogical reality-feeling to judgment is as follows: Originally the child has 'only the sense of presence' (p. 22). Doubt then arises, leading to 'schematism' which when followed by belief gives judgment. ". . . rivalries, embarrassments, hesitations, and adjustments of alternative meanings . . . are the occasion of judgment, and with it reality-feeling passes into belief" (p. 22). "Between them are the various modes of hesitation, caution, doubt, etc." (p. 22, footnote). Accepting Bradley's definition of judgment, as the author does (p. 7, footnote), one may follow this account of the genesis of judgment. But suppose one accepts a definition like Wundt's, Sigwart's, Jerusalem's, or some other? We should like to see more evidence that judgment is preëminently the kind of process here generated: no doubt Professor Baldwin is prepared to give such proofs.

Two other views of judgment, to be sure, are discussed and incorporated into his own: and it is a triumph of genetic method in his hands, to have united Brentano's with the predication theory (p. 31 ff.). Yet we do not quite understand the statement that while *existence* is a predicate of the existential judgment, it is 'not an attributal predicate' (p. 17). How does a predicate differ from an attribute, and how can an assertion form part of its own object?

On the control-side, we find the following modes of belief: assertorial judgment, about objects real or unreal, having maximum certainty: problematic judgment, with minimum certainty: and disjunctive and conditional between the two, with less and greater certainty respectively. Judgments about unreal objects refer always to some sphere of reality, *i. e.*, fiction, psychical fact, etc., and appreciative judgments are always assertorial (p. 44). Near to problematic judgments are the 'semblant' judgments or assumptions of the prelogical modes: strictly speaking however "we are not able to describe such

meanings as judgments; they do not fulfil the belief criterion" (p. 48). Here too belong such questions as are mere proposals. The order of genesis is from semblance onward, in increasing degree of certainty. ". . . genetically the order is from the wider disjunctive to the narrower categorical" (p. 49, footnote—see also pp. 258–259). From disjunctive judgments, with their whole from which a part is chosen, comes knowledge of general, particular, and of mutual exclusion or mutual dependence—the conditional judgment. This, the next higher mode, is 'belief in the details of an uncertain whole,' while the disjunctive was belief in a whole of uncertain details (p. 53). Here, very naturally, the mind learns the difference between the content and the belief or control. So this is the heart of the logical stage. "It is peculiarly a meaning of reflection because it marks and proceeds upon this distinction" (p. 55). Here develop the characteristic logical secretions of *ground*, *implication*, *validity*, etc. This chapter is a masterpiece of genetic method and logical fertility.

Ch. III., 'Common Acceptance and Acknowledgment,' develops the social motives and is unusually difficult. It traces the growth from 'syndoxic' to 'synnomic' or 'appropriate' thought. "A single mind always takes its experience as such—the world of established ideas organized in a system of judgments—to be at the same time the experience or world of ideas of other minds as well, so far as they have the same data to go upon" (p. 61). This is 'syndoxic' thinking: 'synnomic' is 'syndoxic without being also of necessity aggregate or catholic' (p. 72). How does the child learn to do that? Very roughly, as follows: He finds that he can, by imitation of others, putting himself in their place, anticipate their judgments upon objects of his thought as yet unshared with them: the private judgment thus comes to be, that which *could be* common even though it is not. The same he finds true of others' private judgments: they can be, even though they are not, confirmed by him. Thus he learns that judgments may be 'syndoxic' without being actually shared with others. And in doing this he has developed his own sense of private judgment. "The private thought is not a cognitive unit, it is a cognitive outcome" (p. 105). The details of the proof are intricate, and of several of the points more than one proof is given. As was suggested above, we wish, in view of its importance, that the author would expand and clarify it in another work.

Ch. IV., 'Acknowledgment of the Problematical as Disjunctive,' takes up again the development of the belief-categories. The disjunctive has belief or 'presupposition,' the conditional only 'postulation.'

Between the extremes of *all A is B* and *this A is B* (quantity being, as above hinted, derived from the disjunctive) lie all grades of probability or degree of belief. In connection with quantity we read that some universal judgments are not truly quantified, but are intensive. So 'virtue is praiseworthy' is not a quantified universal; 'your act is commendable' need not be a quantified singular (p. 122). This treatment we believe is fairer to our actual meanings and thoughts than that of Bradley and others. The *question* is a disjunctive judgment with the belief-mode made explicit: and thus questions, as embodying probability, have quantity. For example: "Is it a fish?" (As likely as not.) "It's not a fish, is it?" (Few are.) "*What* is it?" (Bare possibility of being a fish) (p. 125). We commend particularly this analysis of the *question*.

The problem about the existence of the subject in universal judgments is answered thus: in all quantified judgments the subject exists, in unquantified, not so (p. 130). Individuals have no exclusive title to existence. 'Why may not all of a class exist?' (p. 131). So they may, if it is a finite collection, we reply: but how about infinite collections, such as all moments of time? Even the 'enumerative' or extensional universal seems often (though certainly not always) non-existent.

Ch. V., 'Contingent Meaning with Postulation,' takes up the next higher grade of belief. In conditional judgment the control is indefinite. There is (p. 135) a 'two-fold reference': it "serves to convey an implication, a presupposition of real existence" in some sphere: "but it also serves merely to suggest a relation, the control being left for further postulation or assumption." "The content is an implication but the control may be left subject to postulation" (p. 135). *Implication* is thus the prime category here; it is a relation between meanings. In this stage, as a peculiarly logical one, the experimental character is especially explicit: we postulate a meaning, to experiment with it, and get its implications.

Ch. VI., 'The Development of Logical Meaning: Predication and Intercourse,' studies the expression of judgment in language, yet confessedly in but one or two aspects. The one great factor which 'fixes genetically both the social motive and the experimental motive' is language (p. 141). This chapter is best regarded, we think, as an extension of Ch. III. The dualism of the logical stage is prettily worked out. Language is both dynamic and static; it expresses personal and changing views ('proposal') and it approximates, in social usage, fixed ideal meanings (elucidation of already known meanings).

According as speaker or hearer do one or the other we have acceptance or question (p. 152). The proposal-character makes truth 'experimental to the last' (p. 155). The most certain statements are true in the most restricted fields (pp. 157-9). One great problem, however, we do not find treated: why is language predicative, and how far does this correspond with the psychical make-up of judgment, or the ideal logical make-up? In this connection it is well noted that many habitual utterances, apparently linguistic expressions of judgment, are not such, since they lack the character of 'proposal' or 'schematism.' Thus, not every sentence is a proposition. As regards the refutation of 'absolute' truth (p. 158 ff.), whether *a priori* universal or singular and private, we do not see how it would meet Professor Royce's position, that *whatever* your proposal it leads to the same result, that result being then absolute. It seems to us that Professor Baldwin in the absence of a proof of close correspondence between thought and language, has proved only that one's statements can never be regarded by others as absolutely sound, without their own verification. Thus, the private or unconfirmed is mere proposal (p. 160) to others: to me it is absolute.

Ch. VII., 'Development of Logical Meaning: Predication by the Term,' brings the young mind to the platform of formal logic. The *proposal* must be justified, by further developments of meaning. These are precipitated in three, which form part of the content: term, proposition, and inference. Why this particular precipitation occurs, we hope the author will some day tell us: it is a delicate problem of genesis. *Terms* are learned by abstraction, which is not, the author very well insists, an underived primitive function, but is an outgrowth, from judgments upon selected contents (p. 186). In this connection is the (to the reviewer at least) welcome doctrine, that abstraction is not necessarily damaging (p. 187) for truth itself is abstract. With knowledge of the abstract comes intension, and with that of the general, extension: here belongs the whole doctrine of terms. The treatment is very full, acute, and we believe sound. Particularly noticeable is the lateness of the singular meaning. 'There is no prelogical singular meaning' (p. 198). This agrees with the results of Meumann and others. Both general and singular are late, if not derived, meanings.

Chapter VIII. on the 'Proposition' gives the categories of quality. The proposition is defined as "the linguistic embodiment of the relational aspects of a conceptual meaning, made object of thought and means of intercourse" (p. 211). We agree: but which are we to study, the embodiment or the meaning? We cannot help feeling that

Professor Baldwin has made the meaning follow the embodiment a little too closely; particularly as to the duality of terms. We believe in that: but, *e. g.*, the impersonal proposition should, we think, receive separate examination. The six groups of categories, however, seem to us beautifully empirical, and to deserve better than the Kantian list: Modality, quantity, community (by whom), community (for whom), quality, relation. Best in this chapter, however, seems to us the genesis of the negative categories out of a primitive relatedness or otherness (focus and margin). Every logician should study this carefully; we believe it the best work yet done on the negative. It gives to it a more fundamental position than has been usually assigned: agreeing more nearly with the results of Groos, Schrader, and others.

Ch. IX., on 'The Import and Characters' of the proposition, treats the analytic-synthetic problem, with no markedly new result: and states that "all propositions have existential reference" to some sphere of existence (p. 255) at the same time going further than many logicians in claiming that neither affirmation nor denial, nor the degree of quantity, make any difference as to the reference to existence. We welcome this doctrine, with the exception of the criticism already suggested about universals.

A special study of the peculiar logical character called *implication* occupies Part III., 'Theory of Implication: Logical Validity.' Of this very full discussion we can do no more than single out a few points that seem to us most important. The mind has learned to isolate relations, and particularly the relation of sameness, on which all reasoning depends. *Validity* is that property by which the content, *Truth* by which the control, realizes the ideal, *Correctness* (p. 281). There are no principles of reason over and above things; *e. g.*, the law of identity is simply an aspect of individuation. "We may . . . define necessity as that intent of the relation between particular and general in virtue of which but one universal judgment of identity can be used to render all the particulars." "Each particular *must in the same sense mean the whole*" (p. 313). *Logistic theory* is (we think rightly) criticized for attempting so complete a divorce between fact and ideal, that it can be of no effectiveness (p. 330).

Part IV., 'The Dualisms and Limitations of Thought,' is of mainly philosophical interest. It criticizes, in Ch. XIII., current pragmatic views from their own psychological ground (as is only right) and finds them on the whole one-sided. Ch. XIV., 'Control through Knowledge,' and Ch. XV., 'Reflection as Self-made,' shows three ways in which thought fails to reach its goal: singular objects, the

thinking subject, and all schematism or intent of judgment, cannot be described (p. 418).

There is much detail, not noticed herein, in all the chapters. The volume might be expanded to two or three, with yet the same material. Particularly useful are the tables in Appendix I. (pp. 419, 420), and in Appendix II. the reply to criticisms, as throwing light on the author's general position. It is not easy to say which of the author's special views seem to us most important: on the whole, however, we think the dualism of content and control is probably the most fertile contribution. Professor Baldwin says of the dualism of belief and assumption or 'schematic' and general (which corresponds to that of control and content), that it is "one destined to prove the most fruitful in the epistemology of modern times." We agree with him, and feel that every treatment of either the logic or the psychology of cognition should proceed along these two lines. Professor Baldwin has surveyed and mapped a region which should now be settled by the logicians.

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LOGIC AND IMAGE.

On Material Representations of Deductive Processes. GIOVANNI VAILATI. *Journal of Philos., Psychol., and Sci. Meth.*, 1908, V., 309-316.

This is a contribution to the problem which confronts all who endeavor to explain mental attitudes and operations. Such explanations must, in the nature of language, be made in physical terms and represented by metaphors of a physical character. The author enters this almost unexplored field of research, and quite thoroughly investigates the uses of metaphors in the description of that important phase of mind action employed in the use of deduction.

There are two ways to undertake such a study: Either take a given metaphor used to represent mind activity and see what mind operations pass through such metaphor; or take a mind action and see what the different images are by which it is represented. The author chooses the latter method and takes deduction, making a study of the metaphors used from time to time in describing and explaining the process.

The various types of images used to describe the fact that one affirmation may be deduced from another are three. First, recourse is had to the terms 'supporting' and 'upholding,' as for instance, the conclusion is said to be 'based' upon, or 'founded' on, given premises.

We speak in similar terms when we say the 'basis' of morals or the 'foundation' of geometry. Secondly, metaphors of 'ascending' or 'descending' are used signifying to 'flow' from or being 'retraced' through. We speak of a fact 'flowing' from other facts. Or we say a proposition is 'traceable' to certain premises. 'Spring' from, 'emanate' from, 'drawn' from are other metaphors of similar signification. Thirdly, the conclusion is often said to be 'included' in the premises, 'contained' in them, etc. We often speak of this relation when we say the premises imply the conclusion. Sometimes, as in case of mere explanation, the conclusion is contained in the premises.

Each of these three general types is taken up and the errors into which their careless use has led are pointed out. The first, the 'founded-upon' idea, leads us to this objection to the 'surety' of the conclusion arrived at deductively: being always 'founded' upon a previous fact, we finally in the regress come, of necessity, to the first fact, which is not verified by deduction. So deduction, instead of being a process of arriving at 'sure' conclusions merely increases the number of assertions which participate in the certainty which, independently of any deductive process, 'some of our beliefs already possess.' So deduction is not a means of *producing* certainties but of *distributing* them. A deducer is a retail dealer or jobber in the commodity of certainties, not a producer of such commodity.

The article takes up both of the other general types of metaphorical uses in representation and analyzes and applies them in a manner similar to the above, shows how they fall short, and often how they lead into error. Space, in this summary, forbids full development of them.

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DEVELOPMENT AND HEREDITY.

The Problem of Age, Growth and Death. A Study of Cytomorphosis. CHARLES S. MINOT. New York and London, 1908. Pp. 280.

Heredity. J. ARTHUR THOMSON. New York and London, 1908. Pp. 603.

Two recent biological volumes of Putnam's *Science Series* are of much general interest. Minot's *Age, Growth and Death* discusses that question of acutely personal interest to each of us: Why do organisms grow old and die? The author's investigations have long been directed to the processes of growth and senescence, and no one

is better prepared than he to deal with the subject. Minot's view is that age and death are a secondary result of that specialization of the cells which is so necessary for full and effective life. We may put the theory in physiological rather than histological garb as follows: The young undifferentiated cell carries on properly all the functions necessary for its own life, — metabolism, growth, reproduction, etc. But as it takes on the special functions required by its place in the organism, becoming muscle, gland or blood corpuscle and differentiating correspondingly, it becomes one-sided. Changes that aid it in carrying out the special bodily functions entrusted to it are a hindrance to those functions which make up its own cellular life. These cellular functions therefore finally weaken and cease; the cell becomes inactive and dies. As this happens in most of the cells of the body, the latter must likewise weaken and die. Thus the welfare of the individual cell is sacrificed to that of the body as a whole, and this in turn involves the final destruction of the body itself. A period of higher, diversified life is purchased at the price of ultimate death.

This differentiation of the cell is called by Minot cytomorphosis. The theory, original with Minot, that it is the fundamental cause of age and death is perhaps now rather generally accepted. Most other theories of the matter seem to reduce, on analysis, to some form of this one.

In his interesting detailed working out of the cytomorphic process, Minot comes to certain paradoxical results, which will doubtless not command throughout such general assent as his main thesis. Cellular differentiation affects the cytoplasm rather than the nucleus, the first step being an increase in the proportional amount of cytoplasm. This cytoplasmic increase is held therefore to be one of the first and fundamental phenomena of senescence. It begins after the egg has divided into a few cells; therefore senescence is held to begin at that time. Again, age is partly characterized by cessation of growth. We find that, relative to the existing weight, growth takes place most rapidly in the very earliest stages of development, decreasing in relative rate rapidly from the very beginning. The rate of decrease becomes less and less, till in age there is hardly any decrease. Hence "we begin with a period of extremely rapid decline, and then end life with a decline that is very slow and very slight." Such ideas recur frequently in the book. To understand them it is evident that we must attach no other idea to 'decline' than *decrease in relative rate of growth*. The commoner idea of the decline during senescence is the decrease in power and effectiveness which begins after strength has culminated through a long period of development. This long development leading up to the culmina-

tion is, according to Minot's criterion, one long period of continual decline. The justification of so paradoxical a view is of course to be found in holding that the decline in growth and the later decline in effectiveness are merely different phases of a single process. But the two are evidently not identical, since effectiveness first increases, then stands still, then decreases, while rate of growth decreases throughout. Possibly Minot would have made his theory clearer without essentially changing it if he had emphasized less the criteria of rate of growth and quantity of cytoplasm.

Thomson's *Heredity* on the whole fulfils its author's aim of providing an exposition of the subject that is 'comprehensive and accurate without being exhaustive and mathematical.' In this case the author is *not* an investigator of the subject dealt with. This frees him from polemical tendencies, and gives him breadth of view rather than profundity or suggestiveness for further work. The book treats not merely the physiology of genetics, but deals with heredity from all standpoints — physiological, mathematical, medical, practical, sociological. The style is attractive; the book is one for the general reader as well as for the special student. It is beyond doubt the best general exposition of the subject that we now have.

The standpoint is that of a thoroughgoing Weismannian who finds it a little difficult to graft the recent experimental Mendelism on the Weismannian stock, but makes a valorous attempt to do so. Experimental workers will probably feel that the author overestimates the value of the results of the mathematical treatment of the matter. While the exposition of the experimental facts of Mendelism is in general excellent, in the sociological application (perilous ground!) the author drops into one of the deceptive pitfalls of Mendelian theory. The case is worth noting, for this particular pit is one that yawns for the unwary, and many there be that fall therein. On page 525 it is suggested that halfbreed stock of mixed European and Asiatic parentage should in later generations break up into pure Europeans and pure Asiatics. "As we have seen, the inbreeding of *hybrids* of peas, stocks, mice, etc., is followed by a splitting of the offspring into true-breeding types like the two parents of the hybrids. We may suggest that a careful inquiry should be made as to the results of intermarriage among Eurasians, for if Mendel's law holds there should be a sifting out of pure Asiatics and pure Europeans, both probably more desirable than Eurasians, fine mentally and physically as the latter often are."

In this passage the author has allowed himself to be misled by the

deceptive Mendelian phrase 'purity of the germ cells,' while forgetting that other cardinal point of Mendelism, the *independence* of the different characters in their later distribution. The later generations become pure (so far as they become pure at all) only with respect to particular parental characters taken separately. There might result an individual that was pure European so far as eye *color* was concerned, but equally pure Asiatic so far as *position* of the eyes (oblique, for example) was concerned; and similarly of all other characteristics, physical and mental. But Mendelism gives no ground for expecting a race pure in all characters to be produced; in view of the thousands of independent characters concerned, the chances are practically infinite against that result ever occurring, once the mixture has taken place. The author reasons as if 'European-ness' and 'Asiatic-ness' were a single pair of alternative characters, when in fact each involves thousands of independent pairs. But such slips are rare; the book is on the whole sound.

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The Idea of Development and its Application to History. GEORGE GALLOWAY. *Mind*, 1907, XVI., 506-534.

After pointing out the careless use of the word development by scientific writers in general, Mr. Galloway says that it must be employed with great qualification in the region of human culture.

Aristotle was the first to formulate the idea of development, but he never seemed to have considered history in the light of his theory. The idea of history was of a cycle and not a progressive movement toward some far off good; this latter idea is directly due to Christianity. Leibnitz was the first to treat the idea of development in modern philosophy, in his theory 'of a continuous time process, teleologically not mechanically determined.' Kant keeps the idea of development in the background, while Lessing was the first to apply Leibnitz's idea in the historic sphere. Herder first treated historic phenomena comprehensively from this point of view and boldly extended the idea from the organic to the spiritual world. Hegel, however, was the most profound writer on the subject of development; for by it he meant the unfolding of what has already potential existence, the cause and end of which are therefore determined. Spencer, Comte, and J. S. Mill all advanced the idea that the important thing in development is the presence of causal connection between the parts and the evidence of the reign of uniformity. In both the philosophy of Hegel

and Mill, therefore, we find the principle of continuity. There are presuppositions involved in the idea of development as illustrated by the growth of organisms; there is the germ, the continuous process in the germ in virtue of which it assumes successive phases, and an end which is set over against the beginning. It is also assumed that the end is that for which the beginning was. The failure of the ordinary causal view is partly due to the fact that it overlooks the idea of progress in time and thus makes way for the teleological view.

Our subjective experience gives us the notion of end. Our sense of voluntary effort embodies itself in our representation of end as something to be achieved. Can we interpret historic progress as an organic development? At the outset we meet the distinction between organic and spiritual or historic development. In the organic we may say it represents what is to be; in historic or spiritual what ought to be. One deals with connected facts: the other with related values. If we take the nation as a unit we find it impossible to apply the rule that the whole moves all together if it moves at all, and the phenomena are too varied to be interpreted on the analogy of organic growth. A particular phase of culture is only an element in the self-conscious life of an individual; therefore, the key to the meaning of historic development is not to be found in a generalized conception of the process as a whole, but in the psychical life of the individuals themselves. Self-conscious minds are the living centers, and psychical events are the real kernels of history. As cause and effect are not found in mental processes, psychical developments must be interpreted as purposive processes which take form in a continuous acquisition of meanings; therefore facts are more than facts; they are values. And here Professor Wundt is quoted to the effect that proximate ends control psychic consciousness, and that man neither knows nor concerns himself with the remote issues of his choice; and Professor Villa is quoted to the same effect. This would tend to make history non-rational.

Mr. Galloway disagrees, however, with this conclusion and says that this view does not properly conceive the teleological aspect of history; for feeling unqualified by a purpose resembles instinct, and instinct does not minister to progress. The distant ends, while less pressing, are always in view. Evolution in the form of an unfolding of an idea strictly fixed in all its stages cannot be shown on the evidence to apply to historical development; but there is a continuity of some kind; and the conclusion is that the process of historical development has within it a certain flexibility, but this flexibility is within the limita-

tions prescribed by the principle of continuity, and hence, the process is never absolutely broken or disconnected. We cannot say, however, that there is continuity in history, but only that the movement is continuous in the direction of progress; for such facts as decadence and disintegration of nations have their place. The question as to whether development is present in history or not, depends largely on the point of view. History is the battle field of values and the ideal takes new forms with the changing life of humanity. The question may be asked, is it possible to describe the process of a development in the sense of a movement from the less to the greater value? In the light of the ultimate value we judge that the movement discloses an increase of value in the line of end or final goal. The objection is that no value which is in process can, in the nature of the case, be final. We would have to define the absolute value in terms of the stage in which it is realized, and this could only be appreciated by reference to the absolute value. Neither the idea of a perfect final state in time, nor that of endless progress in time, satisfies the demands of a consistent theory; hence, to think out the implication of the notion of development as applied to history would bring us into the region of metaphysics. The great difficulty lies with the time idea; for the historic process loses its meaning if time is to be declared unreal. To interpret time as either real or unreal seems untenable; for the first empties history of value, and the second precludes any way of relating the process to its goal. Our present time ideas are not adequate to the goal of history.

The outcome of the argument is, that while our reading of history in terms of our time idea is not illusory, yet when we try to give a satisfying meaning and end to the process in terms of this idea, the statement is inadequate, and we cannot find any meaning in history viewed as a mundane process which will satisfy reason; therefore the meaning transcends the present temporal order. Mr. Galloway assumes, however, that the process is not meaningless; we therefore make the postulate that the solution of the contradiction lies in the transcendent sphere. If there be no continuity between the temporal and eternal values, however, the postulate fails to justify itself. By insisting on the inner relation of each personal life to the Eternal, it seems possible to do justice to personal values, and it may well be that what we term an eternal state of being means simply the deliverance from our present time span, and is not incompatible with change and activity.

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The Hearing of Primitive Peoples. F. G. BRUNER, Ph.D. Archives of Psychology, No. 11, July, 1908. Pp. 113.

In this monograph are presented the results of an interesting investigation to compare the hearing of several races in respect to two problems, namely, the upper threshold of pitch and simple acuity to sound. The investigation was made at the Louisiana Purchase Exposition in 1904. Nearly four hundred individuals were tested who were distributed among different races as follows: 156 Whites, 63 Indians from the Government School, 137 Filipinos, 10 Cocopa Indians, 7 Ainu, 7 Vancouver Indians, 6 African Pigmies, and 4 Patagonian Indians.

Part I. deals with the upper pitch limit. A critical survey of previous researches on this topic is first presented. The tests were made by means of the Edelman form of the Galton Whistle. The measurement on a given individual consisted in proceeding from an audible tone by gradual increments in pitch to an inaudible tone and back again to the audible region. The average of the last audible tone in the former, and of the first audible tone in the latter procedure was considered the threshold. The two ears were tested separately. Most of the experiments were made in a specially constructed booth.

The averages thus found for the three largest groups of peoples are: For the right ear, Whites 32,285 D.V., Indians 31,975, Filipinos 29,916; for the left ear, Whites 33,087, Indians 31,580, Filipinos 29,886. The Whites thus have the highest pitch limit. All the smaller groups were found to be inferior to the Whites with the exception of the six Pigmies, who had a higher threshold. The lowest place is assigned to the Vancouver Indians.

Some further results, obtained from 385 Whites ranging from 5 to 65 years, are given to show the relation between age and upper pitch limit. The figures indicate that the upper threshold remains practically constant up to the sixteenth year, after which there is a gradual lowering during the next thirty years amounting to almost an octave.

Part II., dealing with auditory acuity, is also introduced by a critical, historical résumé. The stimulus consisted of a telephone click whose intensity was varied by a sliding induction coil. The measurements were made according to the method of minimal change proceeding from audible to inaudible sounds.

The results are tabulated in terms of the condensation of the sound wave leaving the instrument and also in terms of the energy in ergs. The Whites were found to have the most acute hearing and the Filipinos the least acute. The three largest groups rank, in terms of

condensation, as follows: Right ear, Whites 5.6, Indians (school) 7.5, Filipinos 24.2; left ear, 7.2, 8.5 and 26.6 respectively. The Indians in attendance at the schools have better acuity than those in their natural habitats. No explanation is given for the inferior acuity of the Filipinos.

This monograph is valuable for the critical survey of previous investigations on the two problems studied and for the comparative data of the different races. The results of the three large groups (Whites, Indians, Filipinos) can be accepted with considerable confidence. Too few representatives of the other peoples were available to make the results final.

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PSYCHOLOGY OF READING.

The Psychology and Pedagogy of Reading, with a Review of the History of Reading and Writing and of Methods, Texts, and Hygiene in Reading. EDMUND BURKE HUEY. New York, Macmillan, 1908. Pp. xvi + 469.

There is special delight in welcoming such a book as Professor Huey has here given us. He has provided the most readable English work on the reading habit, which 'has become the most striking and important artificial activity to which the human race has ever been moulded.' He has worked in its preparation with a two-edged sword, cleaving his way frankly and heartily through many of the mazes of special psychological experimentation and of book-making and school-room practice.

It is extremely difficult to summarize such a volume as this. It has drawn from so many sources in quest of information and suggestion upon the central theme of the conditions and processes of reading both as a racial and an individual experience that the volume must remain its own best digest. The limits of the work are properly recognized by the author, who admits that "no two authors would select the same material for such a work upon reading. I have endeavored to present the most meaningful facts, and those researches in which more or less definite results have been reached. Completeness of treatment and of reference is out of the question in a subject having such various and intricate ramifications" (p. x). The program of twenty-two chapters is startling enough. But the author has saved confusion by a more or less appropriate grouping of the successive chapters under special headings. After the introductory chapter, which calls

attention to the world-wide function and work-a-day demands of reading, Part I. includes eight chapters which treat of 'The psychology of reading.' Part II. comprises four chapters which sketch 'The history of reading and reading methods.' 'The pedagogy of reading,' in six chapters, is the topic of Part III. Part IV., on 'The hygiene of reading,' is made up of only two chapters; and the book closes with a chapter on the future of reading and printing.

The longest portion of the book, Part I., presents a description and analysis of the reading process itself so far as this is known through the results of the rather recent experimental investigations. That most of this work has been undertaken during the past dozen years (p. 16) is a good indication of either the demand that psychological methods should be applied to so-called practical problems, or the failure of science to come quickly to terms with happenings that seem most familiar. In this part of the work the author is probably at his best. He has judiciously selected results appropriate to his theme and the limits of his space, the chief topics being the work of the eye, the amount grasped during a reading pause, the nature of the perceptual process in reading, the nature and function of inner speech, the seizure of meaning, and the speed of reading. The technique and results of his own experimental investigations are mingled critically and appreciatively with the findings of no less than twenty researchers, such as Cattell, Dearborn, Delabarre, Dodge and Erdmann, Holt, Goldscheider and Müller, Lamansky, Landolt, Messmer, Quantz, Woodworth, and the opinions of such authorities as James, Stout and Wundt. The facts discovered and views entertained by these special students of reading are fittingly given in detail, inasmuch as there is peculiar difficulty in presenting final conclusions as to the intimate nature of the mental and physical processes involved. The burden of this work is thus transferred to the reader's own conclusions as the data for views are made to pass before him. It is noticeable that the author has made no use of the studies on eye movements issuing from the Yale psychological laboratory since 1905.

Part I. deals with the processes of reading as organized by adults to-day. Part II. goes to the other extreme in time and exhibits the more objective conditions of reading by taking one back to the beginning of the writing process as traceable in the primitive records of the race. The story of the growth of writing, the alphabet, and the evolution of the modern book is interestingly retold, following such authorities as Clodd, Deniker, Taylor and Tylor. The motif of this section is genetic; but the immediate purport of this historical treatment

however inviting and interesting in and of itself, is not strikingly apparent.

An extended and critical review of the material, methods, and other practical problems of teaching reading is presented in Part III. Following the description of the alphabet, phonic, phonetic, word, sentence, and combination methods of learning to read, the discussion goes into details concerning the good features, the difficulties, and the defects of the various 'systems' of teaching to read now in vogue. The treatment is made interesting by the introduction of passages, pages, and illustrations from the primers and readers mentioned. Of the more than one hundred texts, manuals, and specific systems of teaching reading examined (p. 276), about fifteen representative specimens are treated in detail. The scope of this examination, as well as the record of practices followed by schools and the compilation of the 'best thought' on teaching reading, is limited almost entirely to American texts, schools and educational leaders. The first appearance of 'rules' for learning to read occurs in chapter sixteen. These rules are finally summarized by thirteen practical pedagogical conclusions (pp. 379 ff.).

In the remaining portion of the work one finds a good, brief summary of the hygienic aspects of the reading functions, and an insistence on the objective conditions of type, paper, and printing which are most favorable for the reading, performance. One need not be surprised if it takes more than the mere discoveries in reading hygiene to overcome the vested conservatism of printers and publishers.

In a scientific journal such as this, attention should be called to one particular trait of this work. Probably its most striking feature is the tempered, yet progressive mixture of science and practice. Indeed, the author is fully aware of the limitations of our scientific knowledge of the reading processes and their growth, and he has accomplished with unusual success the rare task of writing a book which can appeal to the scientist, the teacher, and the general reader. Another most helpful feature is the impulse the author seeks to put into the experimental attack upon these problems, not only by the dedication to his 'Fellows in Research,' but by the controlling aim of the whole summary, which is 'not to close the story, but to furnish a new point of departure for further study, and to give perspective for new researches.' That the age of experimentation is still with us can be shown by no finer exhibition in our psychological and educational literature of a spirit of helpfulness in removing the ancient landmarks of dogmatism both in science and in daily practice.

The progress of the discussion is marred not a little by the lack of unity in the bearing placed upon psychology in the several parts. The genetic psychology necessarily creeping in in Part III. (*e. g.*, Chapters XVII. and XIX.) is not provided for in the experimental point of view in Part I. The results gathered in the earlier analyses of the reading process are but meagerly employed as criteria in the discussion of methods of teaching reading. On the other hand, the psychology of dominant genetic interests as typified in the early years and in adolescence, but not foreshadowed in the first part, come in for a good share of guidance in the question of practical applications.

There is a persistent error in referring to the title of Stout's treatise on 'Analytical Psychology.' A selected bibliography of twelve pages is added, and an exhaustive index increases the usefulness of the book.

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Ueber die Erkennbarkeit geometrischer Figuren und Schriftzeichen im indirekten Sehen. A. KIRSCHMANN. Archiv f. d. ges. Psychologie, 1908, XIII., 352-388.

Different geometrical forms of equal area were used in campimeter measurements. The results show that acute-angled figures are more readily recognized than obtuse-angled; that, aside from the difference between the nasal and temporal sides of the retina, both eyes are more efficient for objects on the right side than on the left in the visual field; and that white figures on a black back-ground are more readily perceived than black figures on a white back-ground in the indirect field.

Experimenting with capital letters, the following order was established as the order of legibility:

— AWI — LVXFYEZJTKDUSPBMNRN — OHGQC. —

This tends to show that, other things being equal, acute-angled letters are the best and rounded letters the poorest. The law of light and dark figures was also substantiated for letters.

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DISCUSSION.

IS TASTE A SPATIAL SENSE ?

Taste is usually not regarded a spatial sense, because the spatial localizations which we make of tastes on the tongue are usually couched in terms of touch. The taste stimulus is of such a nature that it cannot be applied without involving touch, no matter how etherial. A crucial experiment may, however, be arranged in the following manner :

Take two pipettes each holding a drop of liquid at normal temperature and of practically the same consistency except that one is only distilled water and the other contains some tastable substance. Such taste substance must be chosen as will not alter the consistency in any way that can be perceived through touch. Now let these two drops fall strictly simultaneously upon symmetrical parts of the tongue so as to be fifteen mm. apart, and require the observer to state which drop contains the taste. For a moderately sweet taste, with the drops applied 30 mm. back from the tip of the tongue, 15 mm. apart, a good observer will invariably be able to tell which drop contains the taste, or if each drop contains a different taste, he will be able to refer each to its proper position. Preliminary experiments show that this taste discrimination is very fine. On the sensitive part of the tongue, the tastable substance would be located accurately even when the two drops are as close together as they may well be without fusing.

This is an exceedingly simple procedure and yet it seems to be a crucial test and settles once for all the fact that taste is a spatial sense. I publish this preliminary note to invite criticism, because the procedure is so simple and the conclusion is so far reaching.

Granted that taste in itself is a refined spatial sense, certain problems present themselves at once, such as : Is it actually of service now ? To what extent do we possess pure taste imagery of location ? Do the anatomical structures justify our conclusion ? What has been the history of the evolution of taste with reference to space-sensing organs ? What is the biological significance ?

This procedure may, undoubtedly, be adapted also for a crucial test of the spatial character of other lower senses, particularly temperature and pain.

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BOOKS RECEIVED FROM MARCH 5
TO APRIL 5.

A Text-book of Experimental Psychology. CHARLES S. MYERS.
New York, Longmans, Green; London, Edward Arnold, 1909.
Pp. xvi + 432.

The Psychology of Skill, with Special Reference to its Acquisition in Typewriting. WILLIAM FREDERICK BOOK. (Univ. of Montana Publ. in Psychology, Vol. I.) Missoula, University Press, 1908. Pp. 188.

NOTES AND NEWS.

AT Stanford University Henry W. Stuart has been promoted to the rank of professor of philosophy, and Lillie J. Martin to the rank of associate professor of psychology.

WE record with regret the death of Dr. Hermann Ebbinghaus, professor of philosophy at the University of Halle, and editor in chief of the *Zeitschrift für Psychologie und Physiologie der Sinnesorgane*.

THE Association of Teachers of Psychology in the Colleges and Normal Schools of the North Central States met at the University of Chicago on April 3.

THE March number of the BULLETIN, on Child and Educational Psychology, was prepared under the editorial care of Professor M. V. O'Shea. The usual acknowledgment was inadvertently omitted.

The following are taken from the press:

DR. R. S. WOODWORTH has been promoted to a professorship of psychology at Columbia University; Mr. H. H. Woodrow has been appointed tutor in psychology at Barnard College.

PROFESSORS MORTON PRINCE and George V. N. Dearborn offer at the Tufts College Medical School a course on psychopathology, which is required for fourth year students of medicine; it is said to be the first of its kind.

THE two Italian journals, *Rivista filosofica* and *Rivista di filosofia e scienza affini*, have been merged; the title of the new journal will be the *Rivista di filosofia*.